General

Guideline Title

ACR Appropriateness Criteria® suspected lower-extremity deep vein thrombosis.

Bibliographic Source(s)

Hanley M, Donahue J, Rybicki FJ, Dill KE, Bandyk DF, Francois CJ, Gerhard-Herman MD, Kalva SP, Mohler ER III, Moriarty JM, Oliva IB, Schenker MP, Strax R, Weiss C, Expert Panel on Vascular Imaging. ACR Appropriateness CriteriaÂ® suspected lower-extremity deep vein thrombosis. [online publication]. Reston (VA): American College of Radiology (ACR); 2013. 6 p. [28 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Ho VB, van Geertruyden PH, Yucel EK, Rybicki FJ, Baum RA, Desjardins B, Flamm SD, Foley WD, Jaff MR, Koss SA, Mammen L, Mansour MA, Mohler ER III, Narra VR, Schenker MP, Expert Panel on Vascular Imaging. ACR Appropriateness Criteria® suspected lower extremity deep vein thrombosis. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 5 p.

Recommendations

Major Recommendations

ACR Appropriateness Criteria®

Clinical Condition: Suspected Lower-Extremity Deep Vein Thrombosis

Radiologic Procedure	Rating	Comments	RRL*
US lower extremity with Doppler	9	The use of this procedure is limited to above the inguinal ligament and below the knee.	O
MR venography lower extremity and pelvis without and with contrast	7	This is the primary modality for pelvic or thigh DVT if US is nondiagnostic. See statement regarding contrast in text below under "Anticipated Exceptions."	O
MR venography lower extremity and pelvis without contrast	7	This procedure can be performed when contrast is contraindicated.	O
CT venography lower extremity and pelvis with contrast	7	This procedure can be performed when MRV is not available or contraindicated.	☢☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate		This procedure is usually appropriate	*Relative Radiation

Radiologic Procedure	Rating	Comments	RRL*
X-ray venography lower extremity	4	noninvasive studies or when thrombolysis is planned. This procedure is reserved for inconclusive, noninvasive studies or when thrombolysis is planned.	☢☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Note: Abbreviations used in the table are listed at the end of the "Major Recommendations" field.

Summary of Literature Review

Introduction/Background

Lower-extremity deep venous thrombosis (DVT) has an estimated annual incidence of approximately 5 per 10,000 in the general population, with the incidence increasing with advancing age. DVT typically starts distally below the knee but can extend proximally above the knee and potentially result in life-threatening pulmonary embolism. Pulmonary embolism can occur in 50% to 60% of patients with untreated DVT, with an associated mortality rate of 25% to 30%. Mortality associated with venous thromboembolism is more commonly seen in patients who present with pulmonary embolism or have advanced age, cancer, or underlying cardiovascular disease.

It is clinically important to determine the location and extent of DVT. DVT that is limited to the infrapopliteal calf veins (i.e., below-the-knee or distal DVT) often resolves spontaneously and is rarely associated with pulmonary embolism or other adverse outcomes. Above-the-knee or proximal DVT, on the other hand, is strongly associated with the risk of pulmonary embolism. The treatment of choice for DVT is anticoagulation to reduce the risk for DVT extension and pulmonary embolism and reduce the likelihood of recurrent DVT and post-thrombotic syndrome. It is generally accepted that the benefits of anticoagulation therapy in patients with proximal DVT outweigh its risks. Because below-the-knee DVT rarely results in pulmonary embolism, the role of anticoagulation therapy in patients with distal DVT remains controversial. However, because one-sixth of patients with distal DVT will experience extension of the thrombus proximally above the knee, serial imaging assessment to exclude proximal DVT extension is recommended at 1 week, if anticoagulation therapy is not initiated at presentation. This issue is complicated by the variability in evaluation for below-the-knee DVT as part of a routine examination. Because DVT and pulmonary embolism are part of the same disease, a proximal DVT is sufficient enough for diagnosing and treating stable patients who have a clinically suspected pulmonary embolus.

Classically, a patient with symptomatic lower-extremity DVT presents with either local pain or tenderness or with edema and swelling of the lower extremity. However, approximately one-third of patients with DVT do not have any symptoms. Often, symptoms are not apparent until there is involvement above the knee. The clinical diagnosis of DVT using clinical risk-stratification scores (e.g., Wells score) alone has, therefore, been less than ideal. Wells et al. suggested using a clinical DVT-prediction score (a.k.a. Wells score) in combination with a blood evaluation for plasma D-dimer, a degradation product of cross-linked fibrin that is elevated during thromboembolic events. DVT is unlikely if the clinical-prediction score is low and the D-dimer levels are normal. However, the highly variable nature of DVT presentation, numerous potential pathologic mimics for DVT, and variations in D-dimer assay performance in certain populations limit the reliability of diagnosis solely on the clinical DVT-prediction score and D-dimer testing. Imaging is frequently required to definitively exclude DVT and properly document the extent of venous thrombosis, which is critical for proper therapeutic management of DVT. Moreover, the clinical-prediction score and D-dimer level are often unreliable for diagnosing recurrent DVT and are not useful for diagnosing alternative conditions, such as an intact or ruptured Baker's cyst, cellulitis, lymph edema, chronic venous disease, and various musculoskeletal disorders that can clinically mimic DVT.

Imaging remains critical for the proper diagnosis and management of DVT. Lower-extremity contrast x-ray venography has been the traditional gold standard for diagnosing DVT but is now rarely used in routine DVT assessment, except in complex cases, e.g., to exclude acute DVT in a patient with a prior history of DVT. In most cases, contrast x-ray venography has been replaced by less invasive techniques, especially ultrasound (US), but also magnetic resonance venography (MRV) and CT venography (CTV). For patients diagnosed with DVT, follow-up imaging can be helpful in guiding management, such as determining whether to continue anticoagulation or when to remove an inferior vena cava filter.

Imaging Options

Contrast X-ray Venography

Contrast x-ray venography is the historic and *de facto* "gold standard" for diagnosing DVT. With this technique, proximal compression tourniquets are applied, and a series of overlapping radiographs are obtained following an iodine-containing contrast medium injected into a dorsal vein in the foot. DVT is present if a distinct filling defect is present in a deep vein, typically in the calf or thigh, but it can often extend to or involve more proximal veins, such as those in the pelvis. Less specific findings for DVT include an abrupt contrast cut-off, the absence of contrast filling, or the presence of collateral venous vessels. Contrast x-ray venography is particularly helpful for assessing recurrent acute DVT in patients with a prior

history of DVT in whom venous anatomy is often complex and difficult to evaluate using other methods.

Ultrasound

US is widely recognized as the most cost-effective and preferred imaging modality for diagnosing proximal DVT. Real-time duplex US is noninvasive, is easily performed (e.g., at the patient's bedside), and can be reliably used for serial evaluation. It is, however, less consistent in diagnostic performance above the inguinal canal and below the knee. The major sonographic criterion is to identify the failure of complete compression of imaged vein walls when pressure is applied to the skin during real-time imaging. US evaluation for DVT is often combined with real-time Doppler imaging, such as duplex, continuous-wave, and color-flow Doppler imaging. Color-flow Doppler imaging can assist in characterizing a clot as obstructive or partially obstructive. Using duplex US for the augmentation of venous flow rarely provides additional information when diagnosing DVT, but it can be useful as a secondary diagnostic tool. A recent meta-analysis found US to have high sensitivity (range, 93.2%–95.0%; pooled sensitivity, 94.2%) and high specificity (range, 93.1%–94.4%; pooled specificity, 93.8%) for diagnosing proximal DVT. In the same study, US was found to have a much lower sensitivity (range, 59.8%–67.0%; pooled sensitivity, 63.5%) for diagnosing distal DVT, which confirmed a widely known diagnostic limitation for this technique. Although there are suggestive US findings, using imaging alone to distinguish acute from chronic DVT can be difficult. Lower-extremity US has also been included in an algorithm for the workup of patients who have a fever of unknown origin after more common causes have been excluded.

Magnetic Resonance Venography

MRV is another noninvasive alternative to contrast x-ray venography that shares many of the clinical advantages of US, such as not exposing the patient to ionizing radiation or iodinated contrast media. However, US remains the preferred first choice for DVT imaging because of its relatively lower cost, wider availability, and portability that facilitates evaluation of critical patients at bedside. MRV does have inherent advantages over US, especially in its ability to delineate extravascular anatomy. MRV can help identify potential sources of extrinsic venous compression that can be an underlying cause for DVT or suggest alternative diagnoses that mimic DVT.

MRV has been shown to successfully diagnose DVT using any variety of pulse sequences or techniques. Patency or DVT can typically be determined without contrast media by using a variety of MRI techniques, such as spin echo, fast-spin echo, time-of-flight, phase contrast, steady-state free precession, or flow-independent imaging. Cardiac-gated cine bright blood MRI can be used to differentiate transient flow artifacts from true filling defects that persist over the cardiac cycle, but it requires real-time review and expertise. Contrast media-enhanced MRV, however, is more reproducible and less susceptible to artifacts. Despite the wide variety of techniques, however, a recent meta-analysis found MRV to have both high sensitivity (range, 87.5%–94.5%; pooled sensitivity, 92%) and specificity (range, 92.6%–96.5%; pooled sensitivity, 95%). When evaluating for proximal DVT, MRV is as sensitive and specific as US or contrast x-ray venography. MRV has the advantage over US in evaluating veins above the inguinal ligament, as 20% of DVTs are isolated to the pelvic veins. As such, MRV has been used for evaluating patients with cryptogenic stroke. MRV does, however, have contraindications and is not recommended for certain patients, such as those with MRI-unsafe devices.

Computed Tomography Venography

CTV can also be used to diagnose DVT. However, there are the same clinical concerns about its use as there are with contrast x-ray venography, namely, patient exposure to ionizing radiation and iodinated contrast media. CTV can be performed either as direct CTV, using a venous injection of iodinated contrast media in a pedal vein similar to that in contrast x-ray venography, or, more commonly, as an indirect CTV using an antecubital vein for a contrast media injection and a delayed-imaging acquisition suitable for deep-venous opacification. CTV, like MRV, has the inherent advantages of cross-sectional imaging for identifying extravascular sources of extrinsic compression that could be underlying causes for DVT. In patients who have a suspected pulmonary embolism, a recent meta-analysis found CTV to have high sensitivity (range, 71%–100%; pooled sensitivity, 95.9%) and high specificity (range, 93%–100%; pooled specificity, 95.2%) comparable to that of US for diagnosing proximal DVT. CTV can also be incorporated into a comprehensive examination that includes pulmonary CT angiography for evaluating both pulmonary embolism and proximal DVT, but it should not be performed routinely in all patients who are being evaluated for pulmonary embolism. There is little evidence to support the use of CTV to diagnose DVT other than as a workup for pulmonary embolism. However, based on the published experience with pulmonary embolism, CTV may be considered a reasonable alternative to MRV for pelvic DVT or when US is nondiagnostic.

Summary

- The initial screening for possible DVT should be performed using a combination of clinical risk-stratification score (i.e., Wells score) and plasma D-dimer assessment.
- DVT typically begins in the distal calf veins and often extends above the knee. DVT can result in a variety of complications, notably pulmonary embolism, which can be fatal. Although the likelihood for pulmonary embolism is sufficiently high for proximal DVT to merit initiation of anticoagulation therapy, the treatment for distal DVT remains controversial.
- Both clinical risk-stratification scoring and D-dimer assessment have limitations, and imaging is typically required for the confirmation of

DVT and proper treatment planning.

- Noninvasive imaging for DVT is most cost-effective when using US. Although it is highly sensitive and specific for evaluating proximal DVT, US is far less sensitive for evaluating distal DVT; repeat US at 1 week is recommended to exclude a proximal extension of thrombus. US can also be used to tailor the duration of anticoagulant therapy.
- MRV and CTV are viable imaging options, especially in patients who are unable to undergo US (e.g., a patient in a cast), are highly suspected of having pelvic DVT, or have nondiagnostic US examinations.
- MRV and CTV have a distinct advantage over US for demonstrating overall venous clot burden, especially within the inferior vena cava and pelvic veins. MRV and CTV can be used to evaluate extravascular anatomy, which can be particularly useful for diagnosing external sources of venous compression or alternative diagnoses.
- Contrast x-ray venography is the time-honored gold standard that is helpful for evaluating more complex cases, such as acute DVT in patients with chronic DVT.

Anticipated Exceptions

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m^2), and almost never in other patients. There is growing literature regarding NSF. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m^2. For more information, see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Abbreviations

- CT, computed tomography
- DVT, deep venous thrombosis
- MR, magnetic resonance
- MRV, magnetic resonance venography
- US, ultrasound

Relative Radiation Level Designations

Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢☢	0.1-1 mSv	0.03-0.3 mSv
☢☢☢	1-10 mSv	0.3-3 mSv
☢☢☢☢	10-30 mSv	3-10 mSv
☢☢☢☢☢	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (e.g., region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."		

Clinical Algorithm(s)

Algorithms were not developed from criteria guidelines.

Scope

Disease/Condition(s)

Lower-extremity deep vein thrombosis

Guideline Category

Diagnosis

Evaluation

Clinical Specialty

Emergency Medicine

Family Practice

Hematology

Internal Medicine

Radiology

Intended Users

Health Plans

Hospitals

Managed Care Organizations

Physicians

Utilization Management

Guideline Objective(s)

To evaluate the appropriateness of initial radiologic examinations for patients with suspected lower-extremity deep vein thrombosis

Target Population

Patients with suspected lower-extremity deep vein thrombosis

Interventions and Practices Considered

1. Ultrasound (US) lower extremity with Doppler
2. Magnetic resonance (MR) venography lower extremity and pelvis
    - Without and with contrast
    - Without contrast
3. Computed tomography (CT) venography lower extremity and pelvis with contrast
4. X-ray venography
    - Pelvis
    - Lower extremity

Major Outcomes Considered

- Utility of radiologic examinations in differential diagnosis
- Cost-effectiveness

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature Search Procedure

Staff will search in PubMed only for peer reviewed medical literature for routine searches. Any article or guideline may be used by the author in the narrative but those materials may have been identified outside of the routine literature search process.

The Medline literature search is based on keywords provided by the topic author. The two general classes of keywords are those related to the condition (e.g., ankle pain, fever) and those that describe the diagnostic or therapeutic intervention of interest (e.g., mammography, MRI).

The search terms and parameters are manipulated to produce the most relevant, current evidence to address the American College of Radiology Appropriateness Criteria (ACR AC) topic being reviewed or developed. Combining the clinical conditions and diagnostic modalities or therapeutic procedures narrows the search to be relevant to the topic. Exploding the term "diagnostic imaging" captures relevant results for diagnostic topics.

The following criteria/limits are used in the searches.

1. Articles that have abstracts available and are concerned with humans.
2. Restrict the search to the year prior to the last topic update or in some cases the author of the topic may specify which year range to use in the search. For new topics, the year range is restricted to the last 10 years unless the topic author provides other instructions.
3. May restrict the search to Adults only or Pediatrics only.
4. Articles consisting of only summaries or case reports are often excluded from final results.

The search strategy may be revised to improve the output as needed.

Number of Source Documents

The total number of source documents identified as the result of the literature search is not known.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Key

Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.

Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.

Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.

Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The topic author drafts or revises the narrative text summarizing the evidence found in the literature. American College of Radiology (ACR) staff draft an evidence table based on the analysis of the selected literature. These tables rate the strength of the evidence (study quality) for each article included in the narrative text.

The expert panel reviews the narrative text, evidence table, and the supporting literature for each of the topic-variant combinations and assigns an appropriateness rating for each procedure listed in the table. Each individual panel member assigns a rating based on his/her interpretation of the available evidence.

More information about the evidence table development process can be found in the ACR Appropriateness Criteria® Evidence Table Development document (see the "Availability of Companion Documents" field).

Methods Used to Formulate the Recommendations

Expert Consensus (Delphi)

Description of Methods Used to Formulate the Recommendations

Rating Appropriateness

The appropriateness ratings for each of the procedures included in the Appropriateness Criteria topics are determined using a modified Delphi methodology. A series of surveys are conducted to elicit each panelist's expert interpretation of the evidence, based on the available data, regarding the appropriateness of an imaging or therapeutic procedure for a specific clinical scenario. American College of Radiology (ACR) staff distribute surveys to the panelists along with the evidence table and narrative. Each panelist interprets the available evidence and rates each procedure. The surveys are completed by panelists without consulting other panelists. The appropriateness rating scale is an ordinal scale that uses integers from 1 to 9 grouped into three categories: 1, 2, or 3 are in the category "usually not appropriate"; 4, 5, or 6 are in the category "may be appropriate"; and 7, 8, or 9 are in the category "usually appropriate." Each panel member assigns one rating for each procedure for a clinical scenario. The ratings assigned by each panel member are presented in a table displaying the frequency distribution of the ratings without identifying which members provided any particular rating.

If consensus is reached, the median rating is assigned as the panel's final recommendation/rating. Consensus is defined as eighty percent (80%) agreement within a rating category. A maximum of three rounds may be conducted to reach consensus. Consensus among the panel members must be achieved to determine the final rating for each procedure.

If consensus is not reached, the panel is convened by conference call. The strengths and weaknesses of each imaging procedure that has not reached consensus are discussed and a final rating is proposed. If the panelists on the call agree, the rating is proposed as the panel's consensus. The document is circulated to all the panelists to make the final determination. If consensus cannot be reached on the call or when the document is circulated, "No consensus" appears in the rating column and the reasons for this decision are added to the comment sections.

This modified Delphi method enables each panelist to express individual interpretations of the evidence and his or her expert opinion without excessive influence from fellow panelists in a simple, standardized and economical process. A more detailed explanation of the complete process can be found in additional methodology documents found on the ACR Web site (see also the "Availability of Companion Documents" field).

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

Ultrasound (US) is widely recognized as the most cost-effective and preferred imaging modality for the diagnosis of proximal deep vein thrombosis (DVT).

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The recommendations are based on analysis of the current literature and expert panel consensus.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Selection of appropriate radiologic imaging procedures for evaluation of patients with suspected lower-extremity deep vein thrombosis

Potential Harms

Gadolinium-based Contrast Agents

Nephrogenic systemic fibrosis (NSF) is a disorder with a scleroderma-like presentation and a spectrum of manifestations that can range from limited clinical sequelae to fatality. It appears to be related to both underlying severe renal dysfunction and the administration of gadolinium-based contrast agents. It has occurred primarily in patients on dialysis, rarely in patients with very limited glomerular filtration rate (GFR) (i.e., <30 mL/min/1.73 m^2), and almost never in other patients. Although some controversy and lack of clarity remain, there is a consensus that it is advisable to avoid all gadolinium-based contrast agents in dialysis-dependent patients unless the possible benefits clearly outweigh the risk, and to limit the type and amount in patients with estimated GFR rates <30 mL/min/1.73 m^2. For more information, please see the American College of Radiology (ACR) Manual on Contrast Media (see the "Availability of Companion Documents" field).

Relative Radiation Level (RRL)

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults. Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document (see the "Availability of Companion Documents" field).

Contraindications

Contraindications

Magnetic resonance venography (MRV) does have contraindications and is not recommended for certain patients, such as those with magnetic resonance imaging (MRI)-unsafe devices.

Qualifying Statements

Qualifying Statements

The American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Hanley M, Donahue J, Rybicki FJ, Dill KE, Bandyk DF, Francois CJ, Gerhard-Herman MD, Kalva SP, Mohler ER III, Moriarty JM, Oliva IB, Schenker MP, Strax R, Weiss C, Expert Panel on Vascular Imaging. ACR Appropriateness CriteriaÂ® suspected lower-extremity deep vein thrombosis. [online publication]. Reston (VA): American College of Radiology (ACR); 2013. 6 p. [28 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1995 (revised 2013)

Guideline Developer(s)

American College of Radiology - Medical Specialty Society

Source(s) of Funding

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

Guideline Committee

Committee on Appropriateness Criteria, Expert Panel on Vascular Imaging

Composition of Group That Authored the Guideline

Panel Members: Michael Hanley, MD (*Principal Author*); Joseph Donahue, MD (*Research Author*); Frank J. Rybicki, MD, PhD (*Panel Chair*); Karin E. Dill, MD (*Panel Vice-Chair*); Dennis F. Bandyk, MD; Christopher J. Francois, MD; Marie D. Gerhard-Herman, MD; Sanjeeva P. Kalva, MD; Emile R. Mohler III, MD; John M. Moriarty, MB, BCh; Isabel B. Oliva, MD; Matthew P. Schenker, MD; Richard Strax, MD; Clifford Weiss, MD

Financial Disclosures/Conflicts of Interest

Not stated

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Ho VB, van Geertruyden PH, Yucel EK, Rybicki FJ, Baum RA, Desjardins B, Flamm SD, Foley WD, Jaff MR, Koss SA, Mammen L, Mansour MA, Mohler ER III, Narra VR, Schenker MP, Expert Panel on Vascular Imaging. ACR Appropriateness Criteria® suspected lower extremity deep vein thrombosis. [online publication]. Reston (VA): American College of Radiology (ACR); 2010. 5 p.

Guideline Availability

Electronic copies: Available from the American College of Radiology (ACR) Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

Availability of Companion Documents

The following are available:

- ACR Appropriateness Criteria®. Overview. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site .
- ACR Appropriateness Criteria®. Literature search process. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available in PDF from the ACR Web site .
- ACR Appropriateness Criteria®. Evidence table development – diagnostic studies. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the ACR Web site .
- ACR Appropriateness Criteria®. Radiation dose assessment introduction. Reston (VA): American College of Radiology; 2013 Nov. 3 p. Electronic copies: Available in PDF from the ACR Web site .
- ACR Appropriateness Criteria®. Manual on contrast media. Reston (VA): American College of Radiology; 90 p. Electronic copies: Available in PDF from the ACR Web site .
- ACR Appropriateness Criteria®. Procedure information. Reston (VA): American College of Radiology; 2013 Apr. 1 p. Electronic copies: Available in PDF from the ACR Web site .
- ACR Appropriateness Criteria® suspected lower-extremity deep vein thrombosis. Evidence table. Reston (VA): American College of Radiology; 2013. 9 p. Electronic copies: Available from the ACR Web site .

Patient Resources

None available

NGC Status

This summary was completed by ECRI on February 20, 2001. The information was verified by the guideline developer on March 14, 2001. The summary was updated by ECRI on March 24, 2006. This summary was updated by ECRI Institute on May 17, 2007 following the U.S. Food and Drug Administration (FDA) advisory on Gadolinium-based contrast agents. This summary was updated by ECRI Institute on June 20, 2007 following the U.S. Food and Drug Administration (FDA) advisory on gadolinium-based contrast agents. This NGC summary was updated by ECRI Institute on December 17, 2010. This NGC summary was updated by ECRI Institute on March 7, 2014.

Copyright Statement

Disclaimer

NGC Disclaimer